How Dimethyl Sulfoxide (DMSO) Naturally Eliminates Cancers

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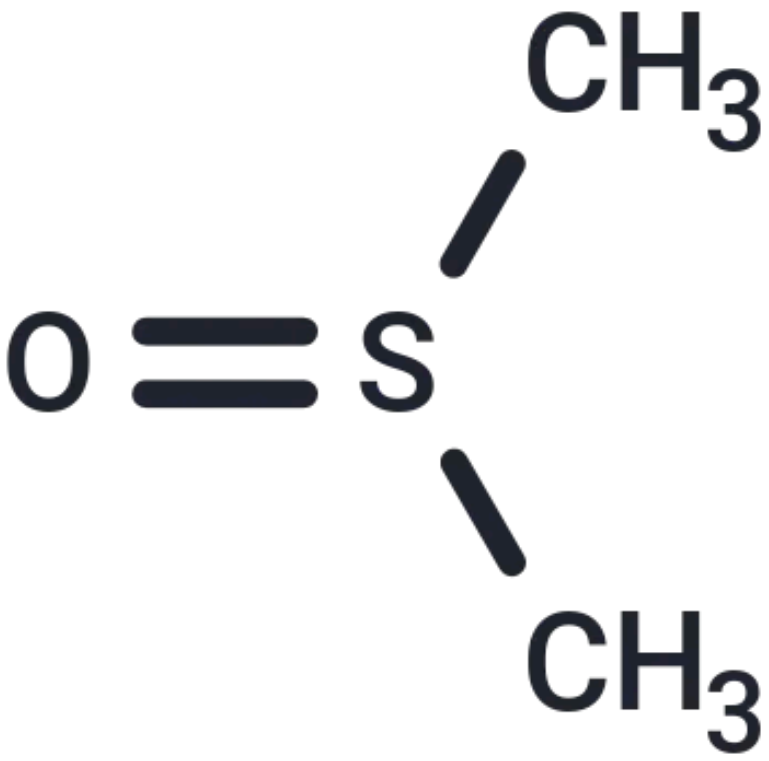

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A Midwestern Doctor

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Dimethyl sulfoxide (DMSO) effectively treats many ailments, including strokes, tissue injuries, autoimmunity, and a myriad of skin diseases and challenging infections

DMSO's unique properties also make it highly suited for both eliminating cancers and protecting the normal cells from cancer therapies

Hundreds of studies have shown DMSO can transform a wide range of cancerous cells back into normal cells — something very few other agents are capable of

DMSO strengthens the immune response to cancer and allows the immune system to recognize and permanently eliminate many different cancers that otherwise evade the immune system

DMSO is directly toxic to cancerous cells and greatly increases the potency of a wide range of natural and conventional anticancer agents. This both increases cure rates and allows lower chemotherapy doses, significantly reducing their toxicity

DMSO is a naturally occurring substance that, when used correctly,[1] safely, and rapidly improves a variety of conditions medicine struggles with — particularly chronic pain. For example, thousands of studies show DMSO treats a wide range of:

• Injuries such as sprains, concussions, burns, surgical incisions, and spinal cord injuries (discussed here).

• Strokes, paralysis, many neurological disorders (e.g., Down syndrome and dementia), and numerous circulatory disorders (e.g., Raynaud's, varicose veins, or hemorrhoids), which were discussed here.

• Chronic pain (e.g., from a bad disc, bursitis, arthritis, or complex regional pain syndrome), which was discussed here.

• Many autoimmune, protein, and contractile disorders such as scleroderma, amyloidosis, and interstitial cystitis (discussed here).

• Head conditions including tinnitus, vision loss, dental problems, and sinusitis (discussed here).

• Internal organ diseases such as pancreatitis, infertility, liver cirrhosis, and endometriosis (discussed here).

• A wide range of skin conditions such as burns, varicose veins, acne, hair loss, ulcers, skin cancer, and many autoimmune dermatologic diseases (discussed here).

• Many challenging infections such as shingles, herpes, chronic ear or dental infections, and osteomyelitis (discussed here).

Sadly, once the FDA realized the extent to which DMSO would transform medicine, the agency made the decision to erase it from history. As a result, millions of patients who it helped and the thousands of studies on its therapeutic potential have been largely forgotten. Consider for example this 1980 60 Minutes program:

In the 1960s a miraculous treatment for chronic pain, traumatic injury, strokes and spinal cord paralysis was discovered that spread across America like wildfire—until the FDA buried it.

Here, 60 Minutes exposed the FDA using the same playbook they used throughout COVID-19. A🧵 pic.twitter.com/Bh0dcjNk5w
— A Midwestern Doctor (@MidwesternDoc) October 14, 2024

Fortunately, because DMSO is effective for a wide range of conditions, it's caught on like wildfire over the last six months (e.g., I've already received over 2000 reports of remarkable responses to DMSO, many for a variety of "incurable conditions"[2]).

DMSO and Cancer

Because of the controversy surrounding DMSO, once its pioneers realized it also treated cancer, a decision was made to downplay this facet of DMSO as “unproven” cancer cures are always attacked by the medical system. As a result, DMSO’s anticancer properties still remain relatively unknown.

In the first part of this series, I presented dozens of studies that show DMSO effectively treats cancer pain (which is often very challenging to address) and dramatically reduces many of the complications experienced from radiation therapy and chemotherapy (as it selectively protects healthy cells from those agents).

Given how debilitating each of those can be for a cancer patient, it is remarkable DMSO has not been adopted for any of those applications, particularly since addressing those does not take business from the cancer industry (and if anything would make more patients want to undergo conventional cancer care).

Note: *65% of oncologists' revenue comes from chemotherapy drugs[3] (which coincidentally are by far the most profitable drug market[4]).*

In this article, I will focus on how DMSO eliminates cancer.

Cancer Differentiation

At the start of life, the first cell can become anything, and as it divides, it becomes more specialized through a process called differentiation. This process is vital in medicine, especially with stem cells, which can replace damaged cells. Cancer, however, is a disease of dedifferentiation,[5] in which normal cells lose their structure and begin dividing uncontrollably.[6]

As such, something that could differentiate cancer cells into normal cells would be immensely helpful in treating cancer. Unfortunately, conventional medicine only has one agent like that (all-trans retinoic acid which is only used for a fairly rare blood cancer[7]).

All of this began in 1971, when a virologist discovered that DMSO could induce differentiation in erythroleukemia cells at a 2% concentration, making most of them revert to normal cells.[8] At higher concentrations, DMSO stopped growth and even killed cancerous cells (and was much less likely to kill mice than those injected with untreated cancer cells).

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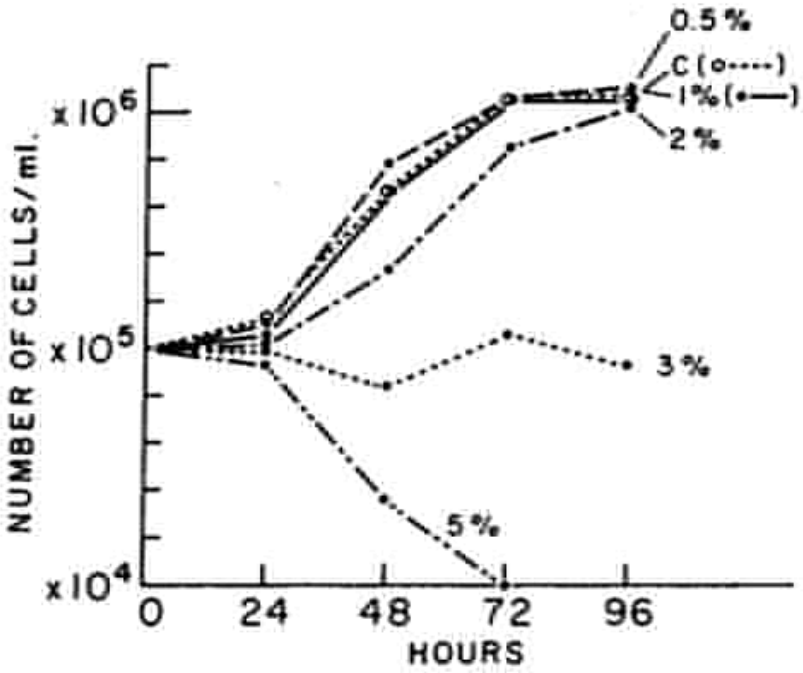

FIG. 1. Dose–response curves of leukemic cells of clone 707 in medium containing different concentrations of DMSO. Control: O- - -O; DMSO: 0.5% ●— —●; 1% ●——●; 2% ●— — — —●; 3% ●- - -●; 5% ●- - — - - — -●.

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Following this, she published a variety of studies that mapped out how this process occurred, which agents suppressed or enhanced it. She showed that the differentiating effect persisted long after DMSO was no longer present.[9,10,11,12] Her work in erythroleukemia was then repeatedly replicated (e.g., I've reviewed 62 corroborating studies,[13] along with 95 more for the related cancer acute myelogenous leukemia[14]).

Note: *DMSO's ability to differentiate leukemic cells was so well recognized that in 1992, it was selected for a microgravity experiment on the International Space Station.*[15]

By 1983, it was recognized DMSO could differentiate 12 different cancer types,[16] and now this differentiating capacity has been repeatedly shown for each of the following cancers:

• **Blood cancers —** Acute promyelocytic leukemia,[17] chronic myeloid leukemia,[18] cutaneous erythromyeloleukemia,[19] hairy cell leukemia,[20] histiocytic lymphoma,[21] Non-Hodgkin lymphoma,[22] T-cell leukemia,[23] T-cell lymphoma[24]

• **Organ cancers**
— Bladder,[25] brain,[26] breast,[27] colon,[28] esophageal,[29] intestinal,[30] kidney,[31] liver,[32]lung,[33] prostate,[34] rectal,[35] ovarian,[36] stomach,[37] thyroid[38,39]

• **Other cancers —** Embryonic carcinoma (into heart cells),[40] fibrosarcoma,[41] melanoma,[42]nasopharyngeal,[43] rhabdomyosarcomas[44]

Collectively, these studies showed:

• DMSO normally differentiated the cancer (it was rare for me to find studies where it did not) and did so in a dose-dependent fashion (e.g., 0.5% to 2% was often used[45]). At higher concentrations (e.g., 1.5%), those changes were often permanent.[46]

• Cancer growth, proliferation, and survival in tandem frequently decreased. In parallel, key tumor suppressing genes increased (e.g., P21,[47] PTEN,[48] and RB[49]), many cancer genes were suppressed,[50] and the cancer cells were weakened (e.g., with transient DNA strand breaks) or induced into programmed cell death.[51,52]

As such, I believe it quite likely that if more cancer cell lines or specific cancer proteins and genes were tested, DMSO would demonstrate anticancer properties in those areas too.

Note: *DMSO has also been repeatedly shown to prevent potent carcinogens from causing cancer.*[53,54,55]

Mechanisms of Differentiation

In addition to DMSO positively changing many factors associated with cancer (e.g., reducing cancer genes, increasing anticancer proteins and altering cancerous

DNA) a few other mechanisms have also been identified by researchers.

First, tumor cells typically grow chaotically, but adding 1% to 2% DMSO led to a more organized structure resembling normal cells.[56] Over four days DMSO caused melanoma cells to reorganize their cytoskeleton, halting their growth.[57] Likewise, in another study, 1% DMSO significantly altered the cellular skeleton of melanoma cells but not regular cells:[58]

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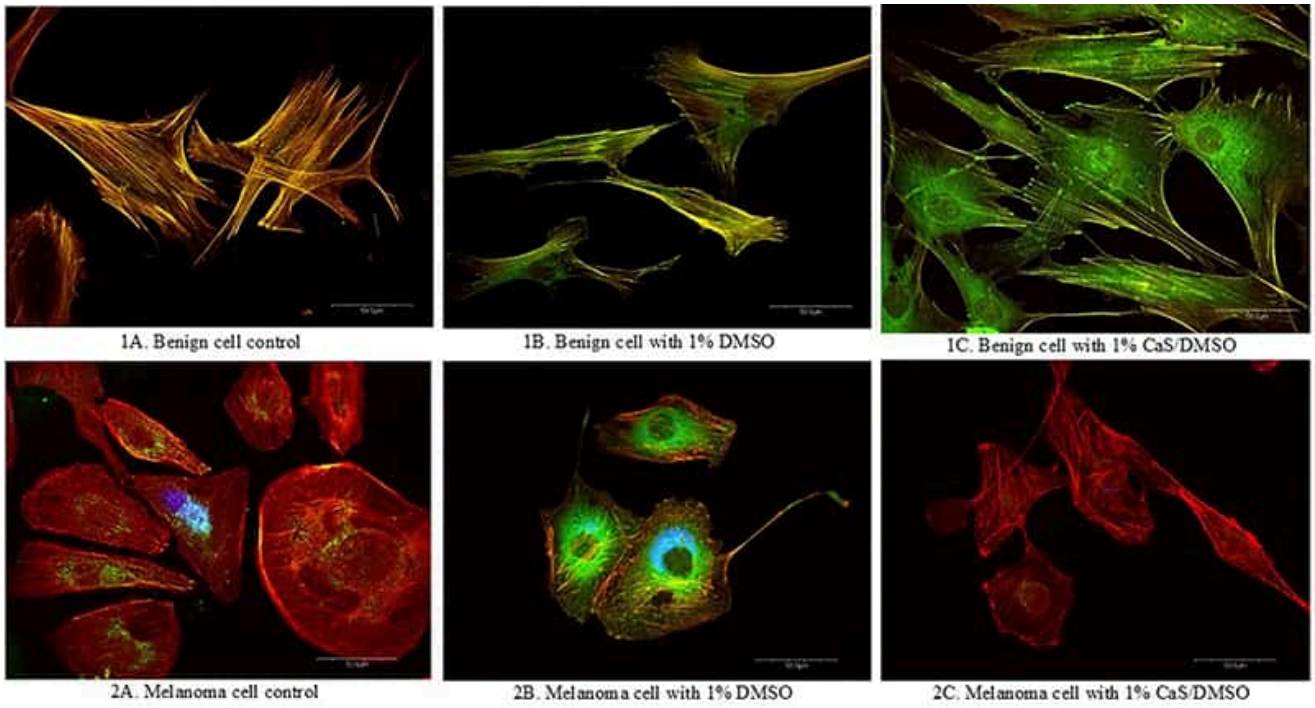

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DMSO also affects other structural aspects of cancer cells:

• It shifts the cell membrane's transition temperature making it more gel-like[59] (a trait shared with other cancer differentiating agents[60]).

• DMSO caused disordered and tightly packed cancer cells to rearrange them themselves into an ordered parallel orientation like that seen in non-cancerous tissues.[61]

Note: *Polar solvents besides DMSO can also both cause these changes and induce cancer cell differentiation, suggesting this is a fundamental component of the differentiation process.*[62]

• DMSO shrank the cytoplasm of cancerous cells by 23% over nine hours.[63]

• DMSO increased the negatively charged phospholipid content in cancer cell membranes,[64]enhancing fluidity and improving the cell's zeta potential (a measure of its electrical charge that determines the tendency for things to clump together).

Collectively, many of these studies touch upon a longstanding observation that the transition to cancer is in part due to the electrical charges and the state of the water within the cells (e.g., it should be in an energy generating liquid crystalline state[65] — something raising the membrane transition temperature promotes), which is a topic I have written more about here.

Additionally, DMSO also dissolves a barrier around cancer cells that prevented chemotherapy drugs from entering them[66,67] and was found to make cytoskeleton target chemotherapies 30 to 1000 times more potent.[68]

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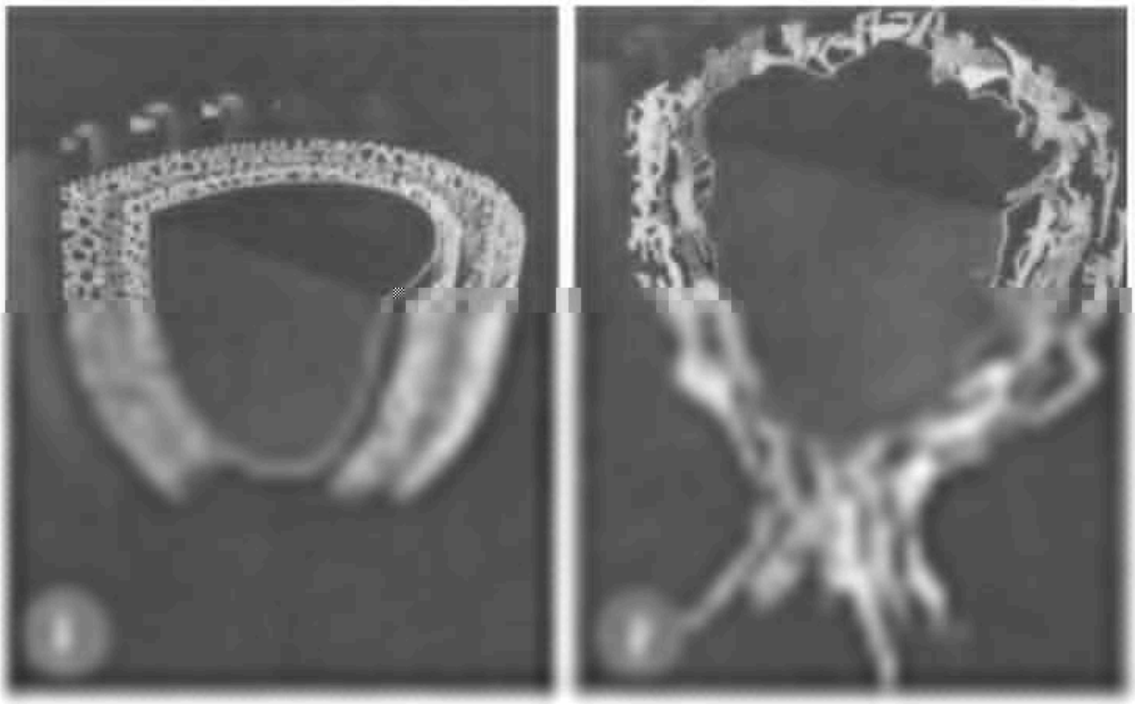

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Note: *DMSO also allows chemotherapy to pass through the blood-brain barrier so that otherwise unreachable brain cancers can be exposed to chemotherapy.*[69]

Pleomorphism

One of the forgotten schools of medicine is that microorganisms can assume different shapes (morphologies) and that particular morphologies can be highly detrimental to health. For example, previous pioneers of forgotten alternative cancer therapies (e.g., Rife[70] and Naessens[71]) believed these hard to detect organisms caused types of cancers, and as I showed here, they are also linked to many autoimmune conditions.[72]

A 1967 Russian study tested cancer patients for pleomorphic bacteria, isolating them from blood samples of patients and those around people who had died from cancer.[73] They took 59 samples from 53 patients and 17 tumor samples, with most

yielding pleomorphic bacteria, which due to their small size, were highly susceptible to DMSO.

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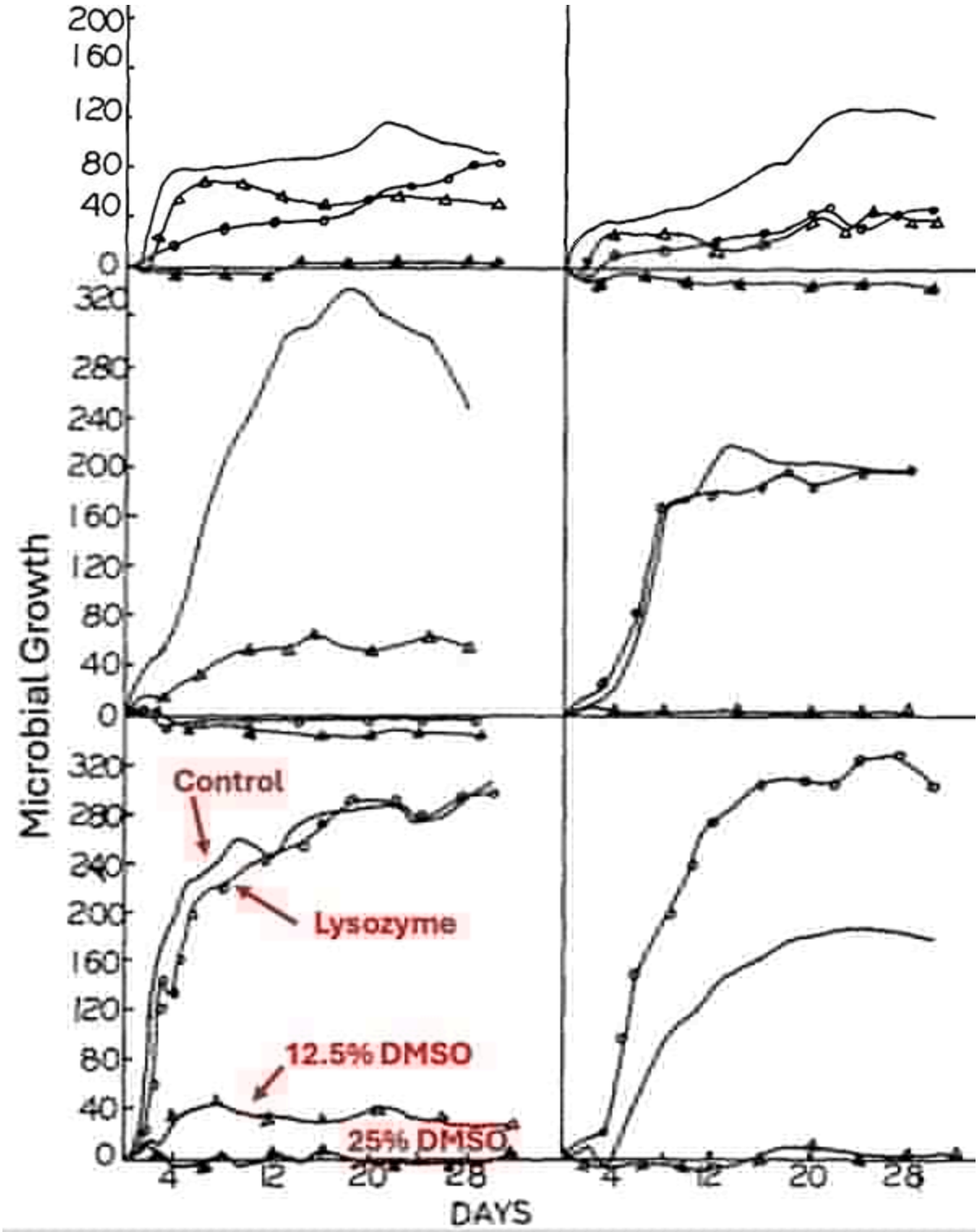

Given that these microorganisms may induce cancerous changes, DMSO's ability to eliminate them could also potentially explain its differentiating properties. Likewise, its ability to eliminate them[74] may explain why DMSO effectively treats so many autoimmune disorders (as pleomorphic bacteria has been repeatedly detected in the reactive tissues).

Cancer Growth Inhibition

When DMSO differentiated cancer cells, it also frequently slowed their growth in cultures or implanted animals in a dose dependent fashion[75,76] (which was often permanent at higher concentrations that were far below the toxic dose to normal cells[77]). For example, consider this 2014 study, where breast cancer cells were implanted into mice who were then injected with DMSO or saline:[78]

In turn, this phenomenon has been observed in various cancers, including AML,[79] breast cancer[80] (doing so more effectively than thalidomide), lymphomas,[81] colon cancer,[82] erythroleukemia,[83] intestinal cancer,[84] liver,[85] lung cancer,[86] melanoma,[87] nasopharyngeal,[88] rectal cancer,[89] ovarian cancer,[90] prostate cancer,[91] sarcomas.[92]

Note: *Very low concentrations of DMSO can affect cancer cells (e.g., a 2021 study found 0.0008% DMSO had significant effects on the biochemical activity of cancer cells[93]).*

Additionally, when DMSO differentiates cancer cells, it can also induce programmed cell death (apoptosis) in them (e.g., in AML,[94] and lymphomas[95,96,97]).

Immune Activation

While DMSO is highly effective at reducing autoimmunity and inflammation within the body, it does not impair the immune system's response to cancer, and if anything enhances it.

A key reason for this is that DMSO achieves what many conventional immunotherapies aim to do — prevent cancer from evading the immune system, thereby allowing the cancer to be targeted and eliminated.

This was first shown by a renowned cancer researcher, who found DMSO caused the immune system to eliminate large rectal HPV warts that were otherwise quite challenging to treat (e.g., in a 1978 JAMA paper he reported successfully treating 22 of 23 patients[98]).

Note: *Topical DMSO can be effective for a variety of skin lesions, including warts and cancer.*

Much later, a pivotal 2016 study proved it was possible to use DMSO to make a simple "vaccine against cancer."[99] It exposed liver cancer cells to 2% DMSO, which temporarily slowed their growth and permanently changed their gene expression.

These treated cells were then injected into mice and, unlike untreated cancer cells, did not form tumors. Crucially, the DMSO-treated cells induced an antitumor immunity that allowed the mice to completely eliminate untreated liver cancer cells.

This treatment also conferred a partial immunity to the mice against certain other cancers, specifically B16-F10 melanoma cells. The study found that DMSO treatment increased the activation of cancer-eliminating immune cells (CD4+, CD8+ T cells, and NK cells). Mice lacking a functional immune system did not respond to this therapy, confirming the importance of the immune response.

DMSO's ability to increase immune recognition of cancers may be due to its changing the exposed antigens or receptors on the cell membrane surface.[100] For example:

•DMSO increased the surface expression of lung cancer H-2K and H-2D antigens at least 100-fold[101] (hence making DMSO aid the immune system in being able to target the cancer[102,103,104]). In a follow-up study, the authors showed this H-2 change greatly increased their susceptibility to being eliminated by the immune system (via H-2-restricted immune lysis).[105] Likewise, DMSO induced surface antigen expression in melanoma[106] and T-cell lymphoma.[107]

•DMSO increased the ability of the spleen (likely its macrophages) to identify and eliminate cancerous cells,[108] and increased the presence of antitumor macrophages while decreasing pro-tumor macrophages.[109]

Note: *Leukemic cells DMSO differentiates into immune cells have an increased ability to mount an immune response to cancers.*[110,111,112]

Cancer Treatment Studies

These cancer fighting properties have also been demonstrated in living organisms. For example:

•A 1967 study induced breast cancers in mice and found that drinking DMSO caused a small reduction in their rate of occurrence and prevented some of weight loss caused by the cancers.[113]

•A 1989 study of rats with aggressive (implanted) prostate cancers found that 2.5% oral DMSO significantly slowed the cancer's growth.[114]

•A 2008 MRI study evaluated the microvasculature of mice with implanted tumors before and after a week course of DMSO.[115] It found DMSO greatly reduced cancer vascular permeability, which is potentially significant for cancer management as leaky blood vessels can support rapid irregular growth or metastasis and can compress surrounding tissues or cause inflammation and sometimes interfere with the delivery of chemotherapy to those cells.

Note: *Many holistic schools of medicine have concluded cancers arise from poor blood flow to a tissue or poor lymphatic drainage from it. Given DMSO's remarkable ability to improve circulation, it is highly possible that this contributes to its ability to prevent cancer.*[116]

•A 2011 study found that in mice with experimentally induced Dalton's lymphoma, injected DMSO was shown to regress their tumors and upregulate TNFα and p53 in lymphoma cells, which impaired their metabolic pathways and triggered an apoptotic pathway (whereas normal white blood cells were unaffected).[117]

Likewise in humans:

•A 1992 study[118] conducted by an Iraqi researcher (who'd found DMSO cured a variety of challenging gastrointestinal conditions[119]) conducted a controlled trial of 198 patients who'd had surgery for colon cancer (in the sigmoid) that had spread into the local lymph nodes, and found that the long term administration of oral DMSO after the electrosurgery significantly improved their 5 year survival.[120]

•That researcher also conducted a 1992 controlled trial of 228 patients who'd just had an uneventful surgery to remove two-thirds of their stomachs (due to stomach cancer).[121] Daily oral DMSO significantly increased their survival rates in the 160 patients who could be evaluated at 5 years.

•A 1999 trial of 25 patients found intravesical DMSO treated bladder cancer.[122]

Additionally, one cancer (multiple myeloma) is characterized by the uncontrolled growth of malignant plasma cells in the bone marrow, which produce abnormal proteins (such as amyloids) that can overwhelm the body. While amyloidosis is challenging to treat, there are over 40 studies demonstrating that DMSO prevents amyloid proteins from clumping together and instead eliminates their deposits from the body (often leading to a clinical improvement[123]).

In turn, case reports have found DMSO effectively treated multiple myeloma amyloidosis in a variety of soft tissues and organs,[124,125,126,127] and in one instance in combination with chemotherapy to treat the cancer as well.[128]

Conclusion

While history is full of effective medical therapies being largely erased from human memory, I have always found the DMSO story particularly unbelievable as there was so much published evidence it worked for a variety of challenging conditions and many (e.g., including respected congressmen, doctors and academics) fought for decades for the FDA to permit its use.

This erasure is particularly remarkable in the cancer field as there are hundreds of studies (including some very recent ones) showing DMSO can effectively achieve many of key goals in modern cancer treatment research.

Yet for some reason, DMSO exists in a bubble where it's acknowledged it can create those anticancer effects as needed in cancer research, but it's almost never then viewed as a cancer therapeutic. For example to quote a 2023 review paper on DMSO's cancer treating properties:[129]

> *"Recently, DMSO has been included in biological cancer treatment and several FDA approved cancer immune therapeutic modalities such as CarT cell therapy[130] and melanoma drug Mekinist (trametinib DMSO).[131]*

> *However, besides its recognized biological role as a pharmaceutical solvent and cryoprotectant, there was no mention of DMSO's possible ability to potentiate therapeutic activity as a component of these cancer treatments."*

Fortunately, because of its ease of availability (made possible by the 1994 DSHEA Act[132]) and frequency with which it produces rapid results, drawing attention to DMSO has allowed it to make a rapid resurgence, and I am hopeful we can make that eventually allow its benefits to be widely available to cancer patients — particularly since DMSO's ability to potentiate natural and conventional cancer treatments completely transforms the treatment of cancer.

Author's Note: This is an abridged version of a longer article that reviews the point mentioned here in more detail and reviews how DMSO reduces cancer pain, the complications of radiation therapy and chemotherapy and how it greatly enhances the effectiveness of both conventional and natural cancer therapies. That article (along with guidance for using DMSO) can be read here.

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